

SECTION 15205

PRESSURE VESSELS

LANL MASTER CONSTRUCTION SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the LEM Mechanical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Information within “stars” is provided as guidance to the author responsible for revising the specification. Delete information within “stars” during editing.

This specification serves as a template. The specification was prepared by an organization operating under a quality assurance program that meets the requirements of 10 CFR 830 (suitable for ML-1 through ML-4 projects). Implementation of this specification requires modification to the specification to meet project-specific requirements. Responsibility for application of this specification to meet project-specific requirements lies with the organization modifying or implementing the specification. The organization modifying the specification shall apply a graded approach to quality assurance based on the management level designation of the project. When this specification is used with nuclear facilities subject to 10 CFR 830, modification to this specification must be performed by an individual or organization operating under a quality assurance program that meets the requirements of that CFR.

This specification is a general specification covering a wide range of LANL pressure vessel applications. It is intended to be used for design/build procurements of pressure vessels.

This specification is applicable both to new acquisitions and to modifications or repair work to existing pressure vessels.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section covers the requirements of closed vessels containing pressurized fluids which fall under the requirements of ASME Boiler & Pressure Vessel Code (B&PVC), Section VIII, Division 1, Rules for Construction of Pressure Vessels. These are “unfired” pressure vessels, though they may operate at elevated temperatures within the limits allowed by Section VIII, Division 1, of the ASME B&PVC .
- B. This specification establishes the technical requirements for the design, materials of construction, fabrication, testing, shipment, and quality assurance (QA) of pressure vessels, their supports, components and appurtenances.
- C. The technical requirements of this specification are applicable to containers used for the containment of pressure, either internal or external.
- D. For pressure vessels containing toxic fluids, where the potential for personnel exposure is significant and a single exposure to a small leakage can cause serious harm, the requirements of ASME B31.3, Category M, also apply although outside the Code’s scope.

- E. The following is a summary of supplier responsibilities described in this specification:
1. Design and fabricate pressure vessels in accordance with this specification, ASME BPVC, Section VIII, Division 1, Rules for Construction of Pressure Vessels, the Supplier's LANL-approved drawings, and other referenced documents.
 2. Furnish design data required by this specification to document design of the pressure vessel.
 3. Procure equipment, materials, or supplies to complete the work, unless otherwise stated.
 4. Test and inspect as required by this specification, ASME B&PVC, Section VIII, Division 1, and ASME B31.3, Category M (if applicable).
 5. Furnish the data required by this specification to document that required tests and inspections have been performed.
 6. Pressure vessel is to be stamped in accordance with ASME B&PVC, Section VIII, Division 1, to show compliance with Code requirements.
 7. Package, ship, and deliver pressure vessel.
 8. Provide LANL full access to the facility for performing random or scheduled inspections and/or surveillance of work performed.

Edit LANL Sections listed below for applicability to meet the project requirements associated with the pressure vessel to be designed and fabricated. Add other Sections if needed.

1.2 RELATED SECTIONS

- A. Section 01330, Submittal Procedures
- B. Section 01630, Product Options and Substitutions
- C. Section 13085, Seismic Protection
- D. Section 05120, Structural Steel
- E. Section 05063, Stainless Steel

1.3 REFERENCES

Codes, specifications, and standards referred to by number or title form a part of this specification to the extent required by the following references. Use codes, specifications, and standards referenced below of the latest revision at the time of award of contract, unless otherwise stated below.

- A. 10 CFR 830.122: Nuclear Safety Management, Quality Assurance Criteria.
- B. ASME Boiler & Pressure Vessel Code (B&PVC), Section II – Part C: Material Specifications – Welding Rods, Electrodes, and Filler Metals.
- C. ASME B&PVC, Section VIII – Division I: Rules for the Construction of Pressure Vessels.
- D. ASME B&PVC, Section IX: Welding and Brazing Qualifications.
- E. ASME B31.3, Code for Pressure Piping: Process Piping, Category M.

- F. ASME B16.5: Pipe Flanges and Flanged Fittings.
- G. ASME B16.47: Large Diameter Steel Flanges: NPS 26 Through NPS 60.
- H. DOE-STD-1020: Natural Phenomena Hazards, Design and Evaluation Criteria for Department of Energy Facilities.
- I. DOE-STD-1021: Natural Phenomena Hazards, Performance Categorization Guidelines for Structures, Systems, and Components.
- J. LANL Engineering Manual.

The author of the targeted specification is required to define many aspects of the pressure vessel design, including management level designation of the pressure vessel in accordance with LIR230-01-02, Management Level Determination. Following the designation of management level, interpret the requirements for the designated management level and define those requirements in this specification. Ensure that the pressure vessel meets the requirements of LIR402-1200-01.0, Pressure, Vacuum, and Cryogenic Systems.

Perform the following analyses or define requirements for the following within the specification:

- Establish the service conditions and design requirements for the pressure vessel, also considering factors associated with startup, normal operation, and shutdown. Determine pressure vessel operating pressures and temperatures, and pressure vessel design pressures and temperatures.
- Determine the materials of construction of the pressure vessel, as required by the service conditions.
- Consider whether service conditions may require corrosion allowances beyond those specified by ASME B&PVC, Section VIII, and specify those allowances to the Supplier.
- Determine if the pressure vessel is to contain lethal substances. If so, specify the additional requirements for the pressure vessel as stated in ASME B&PVC, Section VIII, Division 1. Also, for pressure vessels and attached piping containing toxic fluids, where the potential for personnel exposure is significant and a single exposure to a small leakage can cause serious harm, the requirements of ASME B31.3, Category M, also apply.
- Depending on service conditions--and thus the required tensile strength of the pressure vessel shell material--determine if postweld heat treatment beyond the requirements of ASME B&PVC, Section VIII, Division 1, will be required. If so, specify the postweld heat treatment needed.
- For pressure vessels operating at elevated temperatures, within the limits allowed by ASME B&PVC, Section VIII, Division 1, determine whether there is a need for piping, valves, instruments, and fittings to perform the functions covered by PG-59 thru PG-61 of ASME B&PVC, Section I.
- Determine whether the pressure vessel may be exempt from the requirements of ASME B&PVC, Section VIII, Division 1, or whether it falls under the scope of another Section of ASME Code. (Pressure vessels exempt from the requirements of Section VIII may still be stamped with the Code "U" Symbol, if desired, as long as it meets all applicable requirements of the Code.)
- Pressure vessel is to be stamped in accordance with ASME B&PVC, Section VIII, Division 1, to show compliance with Code requirements.
- Provide a data sheet for the pressure vessel, and a conceptual sketch or drawing of the pressure vessel with the specification to summarize requirements and improve clarity. (Refer to Attachment 1. In some cases, a larger sketch than the one on the data sheet may be needed for clarity.)

- Determine whether the pressure vessel will require any coatings, linings, or insulation. If so, specify or allow the Supplier to recommend a system for LANL approval.
- Before beginning pressure vessel procurement, review the designated installation site for any building, facility floor, concrete slab, or soil loading limitations. Determine what foundation structures may be needed to support the vessel. Determine if there are any clearance problems in moving the pressure vessel to its installation site.

1.4 SYSTEM DESCRIPTION

A. General Design Requirements

1. For pressure vessel operating conditions, design data, and vessel configuration refer to Attachment 1, Pressure Vessel Data Sheet.
2. Design and fabricate pressure vessels in accordance with this specification, ASME B&PVC, Section VIII, Division 1, the Supplier's LANL-approved drawings, and ASME B31.3, Category M (where applicable) and applicable regulations.
3. If there is a conflict among the above listed requirements, compliance with ASME B&PVC, Section VIII, Division 1, and applicable regulations will take precedence. Bring any conflicts to LANL's attention for resolution.
4. LANL will review and comment on design calculations and drawings, unless LANL chooses to waive this right. The LANL review does not release the supplier from responsibility to design and fabricate the pressure vessel in accordance with ASME B&PVC, Section VIII, Division 1, applicable regulations, and this specification.
5. Stamp pressure vessels per ASME B&PVC, Section VIII, Division 1.

B. Shell and Head Design Requirements

1. General
 - a. Unless specified otherwise by LANL, design pressure vessels for a minimum external pressure of 2.5 psig at 300 °F.
 - b. Obtain LANL approval for use and design of internal stiffeners for higher external pressure applications.
 - c. Conical transition sections shall have knuckles, unless specified otherwise.
2. Pressure Retaining Joints
 - a. Identify joints that are to be welded from one side only.
 - b. Obtain LANL approval of proposed weld joint configurations prior to fabrication, unless LANL chooses to waive this requirement.

C. Nozzle & Manway Requirements

Define the piping systems that will interface with the pressure vessel and specify the necessary nozzles and connections required on the pressure vessel. Specify any maintenance access openings (manways), or other large openings, needed on the pressure vessel. Include small penetrations, such as pressure and temperature monitoring ports. Check whether level monitoring instrumentation is required. Also specify plugged spare penetrations for possible future use, if desirable. Provide a data sheet with nozzle schedule and a conceptual sketch to clarify pressure vessel configuration (Refer to Attachment 1).

1. Unless specified otherwise, external nozzle flanges are to conform to ASME B16.5 or ASME B16.47, as applicable.
2. External flanges are to be weld-neck type attached with full-penetration welds. Obtain LANL approval before using other types of flanges.
3. Make nozzles that are used as drains flush with the vessel interior surface.
4. On vessels that are supported by a skirt, extend the flange of bottom head nozzles outside of the skirt for access.

Provide the Supplier with a reasonably detailed sketch of the pressure vessel that will serve as a baseline for the design. Provide interface and other information important to LANL requirements that would be unknown to the Supplier. As part of the sketch, determine and specify the material used for the pressure vessel support structure to meet LANL facility requirements. Determine and specify other support stand requirements such as required strength, height, field location requirements of anchoring, etc.

D. Structural/Supports

1. Pressure Vessel Supports
 - a. Unless otherwise specified by LANL, design all vessels as self-supporting units, including legs, skirts, saddles, etc., as necessary to provide the required vessel elevation. Consider wind, snow, and seismic loadings in support design, depending on installation method and location. Allow for thermal expansion and thermal expansion loads during support design. Assume that a field hydrostatic test will occur where the vessel will be filled completely full of water, and account for this extra weight in the support design. Also allow for temporary erection loads on pressure vessel structure.
 - b. Support pressure vessels by welded or bolted leg and brace arrangements, mounting pads, skirts, or saddles, depending on vessel size and configuration. Horizontal pressure vessels are to be supported with two saddles, minimum 120° saddle angle. If bearing plates are used, do not locate on top of girth or long seam welds.
 - c. Design and fabricate pressure vessel supports and attachments in accordance with good structural design and practice, and ASME B&PVC, Section, VIII, Division 1, Appendix G, Suggested Good Practice Regarding Piping Reactions and Design of Supports and Attachments.

- d. Design pressure vessel supports to meet DOE Performance Category (PC) requirements for the [insert proper category] category.

Determine and specify pressure vessel lifting requirements, including any LANL-specific hoisting and rigging requirements for the pressure vessel design.

2. Lifting Points – Pressure Vessel Structure

- a. Incorporate lifting features into the pressure vessel design as required. Design and position lifting features to prevent any strain or distortion of the pressure vessel. Design lifting features to accept lifting by forklift, crane, or other appropriate device, and label these features appropriately as lifting points.
- b. If lifting lugs are not provided as a feature of the design, indicate suitable lifting points on the main pressure vessel framework. If necessary, provide external strong-backs or other bracing devices.

Determine whether a seismic analysis is required on the pressure vessel and to what extent. Determine and specify the applicable seismic performance category (PC) of the pressure vessel. Where applicable specify floor response spectra, peak accelerations, damping ratios, etc. necessary for the supplier to perform seismic analyses.

Depending upon the quantity and characteristics of the material being contained, design pressures and temperatures, and PC category, design pressure vessels and attached process piping to withstand a design basis earthquake (DBE).

Consult the LANL Engineering Manual Structural chapter to determine and specify the performance category requirements of the pressure vessel including the performance and leak integrity of the pressure vessel both during and after a design basis earthquake (DBE).

3. Seismic Design

- a. Design pressure vessel to withstand a design basis earthquake (DBE) as specified by LANL. The performance category of the pressure vessel is PC-[X].
- b. Perform seismic analysis of the pressure vessel in accordance with the applicable performance category requirements, and as stated in DOE-STD-1020, DOE-STD-1021, and the LANL Engineering Manual, Chapter 5, Structural.
- c. If the mass and center of mass of the fluid inside the pressure vessel fluctuates, use the maximum possible fluid level (e.g., full) of the heaviest fluid that will be used in the pressure vessel for the seismic calculation. Also check “splashing/sloshing” inertial loads due to a partially full tank. Account for valves and accessories attached to vessel.
- d. Allow for a possible accidental offsetting of the center-of-mass by [5%] of the plan dimensions from the calculated location, and a potential increase in weight of [25%] (valves/equipment attached to tank may change).
- e. Refer also to LANL Section 13085, Seismic Protection.

1.5 SUBMITTALS

- A. Provide submittals in accordance with the requirements of LANL Section 01330, Submittal Procedures.
1. Provide reference to LANL Project I.D. Number, LANL Contract Number, Pressure Vessel Number, Pressure Vessel Title, and Drawing Number on correspondence. LANL may choose to waive some of these submittals if the Supplier has been granted prior approval by LANL for recent contract submittals.

Note to Specification Author: Add or delete project specific requirements as required.

- B. Drawings, Calculations, and Supporting Data
1. Submit design drawings, calculations, and supporting data prior to beginning pressure vessel fabrication. LANL will review and comment on design calculations and drawings, unless LANL chooses to waive this right. The LANL review does not release the supplier from responsibility to design and fabricate the pressure vessel in accordance with ASME B&PVC, Section VIII, Division 1, applicable regulations, and this specification. Include assumptions and input/output data with the calculations. If computer calculations are performed, include the name of the calculation program and the version number.
- C. Quality Assurance/Quality Control
1. Submit an uncontrolled copy of his QA manual for LANL approval. LANL may waive this requirement if the Supplier's QA program has been previously reviewed and approved.
 2. Notifications: Notify LANL at least 7 days in advance for a Weld Fit-up Inspection and also for Acceptance Testing/Final Inspection, unless waived by LANL.
 3. Submit a Lower Tier Services Plan if outside subcontractors will perform some of the work. Provide LANL with the name, address, telephone number, and point of contact for outside services that the supplier intends to use on this project. Identify the specific work requirements of this specification that will be performed by those outside services.
 4. Submit a Fabrication Schedule.
 5. Material Control Procedure
 - a. Prior to fabrication, submit for LANL approval a material control procedure to be used in the execution of the work. Describe the control methods and traceability documentation in the procedure used by the supplier to handle and monitor the use of controlled materials, such as stainless steel and welding filler rod. Address in the procedure items such as procurement controls, segregation of materials, and traceability of materials from receipt at the shop through processing and final assembly.
 - b. Heat Numbers: Note heat numbers on weld maps using low-chloride content marking pens on each piece part and transfer the material identifications to the as-built drawings.

6. Fabrication Procedures: Submit a copy of
 - a. Welding Procedure Specifications (WPS),
 - b. Welding Procedure Qualification Record (PQR),
 - c. Welding & NDE Personnel Listing,
 - d. Liquid Penetrant Test Procedure,
 - e. Radiographic Test Procedure, and
 - f. Leak Test Procedure.
7. Certifications: Submit a copy of
 - a. Welder Performance Qualification Records,
 - b. NDE Personnel Certifications,
 - c. Material certifications for steel, weld filler materials, and the chloride content of materials used in fabrication of stainless steel, and
 - d. Supplier's ASME "Certificate of Compliance," in accordance with UG-120, of ASME B&PVC, Section VIII, Division 1.
8. Test Reports: Submit a copy of
 - a. Liquid Penetrant Test Report,
 - b. Radiographic Test Report, and
 - c. Hydrostatic Leak Test Report.
9. Shipping Submittals: Submit a copy of
 - a. Supplier's vessel Cleaning Procedure,
 - b. Supplier's Packaging Procedure, and
 - c. Bill of Lading with shipment.
- D. Nonconformances
 1. Submit a written request to LANL for any proposed technical changes, exceptions, and/or deviations to this specification or other contract documents. Do not implement proposed changes, exceptions, or deviations until the LANL Contract Administrator provides written approval.
 2. Conflicts: Notify LANL as soon as possible in the event of conflicts among the specifications, drawings, and/or the manufacturer's recommended processes or instructions.
 3. Ensure that any substitutions are in conformance with LANL Section 01630.
- E. Warranty: Supplier is to guarantee the pressure vessel and associated equipment at design conditions and warrant that materials and workmanship, plus apparatus supplied (if any), are in accordance with contract document requirements.

1.6 QUALITY ASSURANCE

- A. The Supplier's QA program shall control the combination of design, materials, preparation, fabrication, inspection, testing, cleaning, packaging, and shipping that have to be done correctly to ensure the production of an acceptable finished product and compliance with 10 CFR 830.122.

- B. Pressure vessels shall be furnished by a firm qualified, accredited, and regularly engaged in this type of work for a period of no less than [3] years. Supplier shall maintain shop and facilities suitable for fabrication of pressure vessels. Supplier shall maintain a Quality Control Program that complies with ASME B&PVC, Section VIII, Appendix 10.

1.7 DELIVERY, STORAGE & HANDLING

- A. Shipping Preparation: Mode and method of transporting, and the extent of pressure vessel assembly, are to be mutually agreed on by the Supplier and LANL prior to fabrication and delivery of the vessel. The LANL approved packaging procedure will be used. For safety considerations, a means of pressure relief is to be provided on the pressure vessel during shipping to prevent any pressure buildup and/or to equalize pressure due to elevation or temperature changes.
- B. Shipping & Receiving: Provide LANL with a copy of the bill of lading concurrent with the shipment. Properly and clearly describe the shipment on the bills of lading. At final destination LANL will inspect the shipment as necessary to ensure that received items have not been damaged during shipment and that required items and supporting documentation have been received. The receipt inspection by LANL at Los Alamos constitutes final acceptance.

1.8 SITE CONDITIONS

Design pressure vessels and associated components for a design altitude of 7,500 feet above sea level. Design pressure vessels and associated components for a design ambient temperature appropriate to the installation location.

PART 2 PRODUCTS

Establish an Approved Vendors List for pressure vessel vendors in accordance with the appropriate Quality Assurance Program Plan. Specification authors will select vendors from the approved vendors list. For a listing of currently approved vendors, contact NMT Division.

2.1 MANUFACTURERS

- A. List companies from an approved vendors list that specialize in designing and manufacturing the products specified in this Section with suitable documented experience of performing similar work.

Determine and specify the type of material to be used for the pressure vessel shell, nozzles, connections, hatches, supports and other appurtenances. Specify material based upon application and compatibility with the process and corrosive environments. Some structural shapes may be difficult to obtain in certain materials, without special order (allow for longer lead times).

2.2 MATERIALS

- A. Provide materials complying with ASME B&PVC, Section II, "Materials."

Determine and specify the type, thickness and configuration of pressure vessel linings, coatings where needed or request Supplier's recommendation for LANL approval.

B. Protective Linings and Coating (Where Required)

1. Pressure vessel Supplier shall evaluate the design conditions supplied by LANL and determine whether vessel linings and/or coatings may be required. If so, Supplier shall recommend the preferred lining and/or coating system to LANL for concurrence and approval.

2.3 FABRICATION

- A. Protect stainless steel against carbon steel contamination from tooling and fixtures during fabrication.
- B. Exercise control during stages of fabrication to minimize exposure of stainless steel to contaminants, in particular any chloride that might cause stress-corrosion cracking. Avoid chloride-bearing compounds; however, if used, completely remove by thorough cleaning. Do not use compounds, liquids, or markers with more than 250 ppm of chloride content by weight on stainless steel surfaces.
- C. Welding: Ensure that welders, welding operators, and tackers are qualified in accordance with ASME B&PVC, Section IX, Welding & Brazing Qualifications. Use welding procedures per ASME B&PVC, Section IX, Welding & Brazing Qualifications.
- D. Surface finishes: Exercise care to prevent scratching, abrading, nicking, and denting of the pressure vessel during receiving, storage, fabrication, and handling.
- E. Cleaning:
 1. Submit for LANL review and approval a cleaning procedure describing the methods, materials, controls, and inspections to be used to perform pressure vessel cleaning operations. Provide a procedure that addresses cleaning pressure vessel surfaces to remove dirt, oils, and marking pen ink. Include a specification of the solvents and/or detergents that will be used.
 2. After fabrication is completed and before testing and inspection, clean, de-scale, and degrease the pressure vessel and associated components.
 3. Clean exterior surfaces, but take particular care to clean the inside of the vessel thoroughly. Methods may include cleaning by hot water spray, etc. Ensure pressure vessel cleanliness meets the approval of LANL at the time of the final inspection. If a detergent is needed to ensure thorough cleaning, use a detergent that is than 250 ppm of chloride content by weight for stainless steel. Use fresh water for final wash and rinse. Ensure the detergent, wash, and rinse contains less than 250-ppm chloride content. After the water rinse, dry inside surfaces using heat, lint-free cloth, or other means to ensure cleanliness.
 4. If heat is used for drying stainless steel vessels, do not allow metal temperature to rise above 250 °F and use de-ionized water for the final rinse.

2.4 SOURCE QUALITY CONTROL

A. Shop acceptance tests:

1. Perform inspection and testing of the completed pressure vessel in accordance with the requirements of ASME B&PVC, Section VIII, Rules for Construction of Pressure Vessels, and ASME B31.3, Category M (if applicable).
2. Provide the test location, equipment, instrumentation of certified accuracy, and any supplementary temporary connections and auxiliary parts necessary to fully execute the tests.
3. Provide test personnel qualified to conduct, record, and verify test results. Submit the test results as part of the QA Document Package in accordance with LANL Section 01330.
4. Provide LANL with a minimum seven (7) working day advance written notice of shop acceptance tests.

B. Weld Inspection

1. Radiography: Unless specified otherwise, the minimum radiography required is spot radiography in accordance with UW-52 of ASME B&PVC, Section VIII, Division 1.
2. Magnetic Particle and Liquid Penetrant Examination: If specified, perform magnetic particle examination on the following welds:
 - a. Fillet welds on the pressure boundary,
 - b. Back-chipped surface of full penetration welds, and finished weld surface of full penetration welds.
3. Liquid penetrant inspection may be substituted for non-magnetic material, or if approval is obtained from LANL. Perform liquid penetrant testing after any grinding and polishing operations. Repair and re-test detected defects.

C. Hydrostatic or Pneumatic Pressure Test:

1. Perform to the requirements of ASME B&PVC, Section VIII, Division 1, and ASME B31.3, Category M (if applicable). Ensure that weld surfaces are free of coating materials during test. Hold hydrostatic test pressure for 15 minutes, minimum.
2. Water for shop-testing austenitic stainless steel vessels shall be potable quality with a chloride ion content of less than 50 ppm. After testing, drain water and dry — standing water is not allowed to evaporate to dryness, unless de-ionized water is used as a final rinse.

D. Test Reports: Provide test reports as required by the contract documents and this specification. Include the following information in the test report:

1. Pressure vessel identification,
2. Date of test,
3. Name and signature of the certified test operator,
4. Location and description of indications,
5. Description of repairs and retest, and

6. Signature of witness.
- E. Nameplates & Labeling: Attach an identification nameplate to each pressure vessel in accordance with the requirements stated in ASME B&PVC, Section VIII, Division 1. Also attach a nameplate containing LANL identification information to each pressure vessel. ASME and LANL nameplates may be incorporated into a single nameplate, if desired. Clearly separate the ASME information from the LANL information. Nameplate cannot be removed without destruction of the nameplate.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation of pressure vessels is facility-specific and not covered in this Section. The specification author is to address installation for his specific location and application. Install pressure vessels in accordance with ASME B&PVC, Section VIII.

END OF SECTION

Do not delete the following reference information:

FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Rev. 0, dated December 5, 2002.

Section 15205 – Attachment 1

Pressure Vessel Data Sheet And Sketch Example

SPECIFICATION SHEET LOS ALAMOS NATIONAL LABORATORY				PRESSURE VESSEL DATA SHEET			
CUSTOMER:				ITEM No.			
PLANT LOCATION:				UNIT NAME			
PROJECT:				JOB NO.			
REV No.		BY		CHECKED		DATE	
DESIGN DATA							
CAPACITY: _____				GALLONS			
OPERATING PRESSURE: _____				PSIG @		° F	
DESIGN PRESSURE-EXTERNAL: _____				PSIG @		° F	
DESIGN PRESSURE-INTERNAL: _____				PSIG @		° F	
CORROSION ALLOWANCE: _____				SHELL: _____		HEADS: _____	
DESIGN <input type="checkbox"/> ASME SECTION VIII <input type="checkbox"/> OTHER <input type="checkbox"/>							
<input type="checkbox"/> STRESS RELIEVE <input type="checkbox"/> X-RAY							
WIND LOAD: UBC MAP AREA _____							
SEISMIC ZONE _____							
PART		MATERIAL		DESCRIPTION			
SHELL				<input type="checkbox"/> VERTICAL <input type="checkbox"/> HORIZONTAL			
HEADS				<input type="checkbox"/> SEMI-ELLIP <input type="checkbox"/> DISHED			
LINING							
SUPPORTS				<input type="checkbox"/> LEGS <input type="checkbox"/> SKIRT			
MANHOLES				<input type="checkbox"/> HINGE <input type="checkbox"/> DAVIT			
NOZZLES							
COUPLINGS							
INTERNALS							
CLIPS							
LUGS							
RINGS				<input type="checkbox"/> INSULATION <input type="checkbox"/> VACUUM			
DAVIT				LOADING			
LINING: SPECIFICATION _____				THK. _____		IN. _____	
FIREPROOFING: SPECIFICATION _____				THK. _____		IN. _____	
<input type="checkbox"/> BY VENDOR <input type="checkbox"/> BY PURCHASER							
INSULATION: SPECIFICATION _____							
<input type="checkbox"/> BY VENDOR <input type="checkbox"/> BY PURCHASER							
SURFACE PREPARATION: SPECIFICATION _____							
<input type="checkbox"/> BY VENDOR <input type="checkbox"/> BY PURCHASER							
PAINTING: SPECIFICATION _____							
<input type="checkbox"/> BY VENDOR <input type="checkbox"/> BY PURCHASER							
FAB WT. _____		OPERATING WT. _____		TEST WT. _____			
NOZZLES							
MARK	SERVICE	QTY	SIZE	RATING	FACING		
	Inlet						
	Outlet						
	Relief Valve						
	Drain						
	Pressure Gauge						
	Level Gauge						
	Spare Instrumentation						
REMARKS:							
				SPEC NO. SECTION 15205 REV. _____			
				SHEET _____ OF _____			

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